

Asbestos in the Environment - A Review of the Science

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El Dorado Public Meeting

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Asbestos - A Review of the Science

- Science Meetings, Aug 18th & 19th
 - Asbestos Introduction
 - Asbestos in California
 - Asbestos & Health
 - Measurement & Monitoring of Exposures
- U.S. EPA's concern re: El Dorado

Asbestos - A Review of the Science

■ Science Meetings, Aug 18th & 19th

- Asbestos Information
- Asbestos in California
- Asbestos & Health
- Measurement & Monitoring of Exposures

Asbestos Science Meetings

- August 18th & 19th, 2004 - Folsom
- U.S. Environmental Protection Agency (U.S. EPA)
- U.S. Geological Survey (USGS)
- California Geological Survey (CGS)
- Agency for Toxic Substances & Disease Registry (ATSDR)

Presentations

- USGS & CGS: Asbestos in California and El Dorado County
- ATSDR: Health Effects of Asbestos Exposure
- U.S. EPA: Measuring Exposure to Environmental Asbestos

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What is Asbestos?

- Naturally occurring mineral with thin, separable fibers.
- "Asbestos" = fibrous form of the minerals
- Resistant to heat, fire, and chemical & biological breakdown

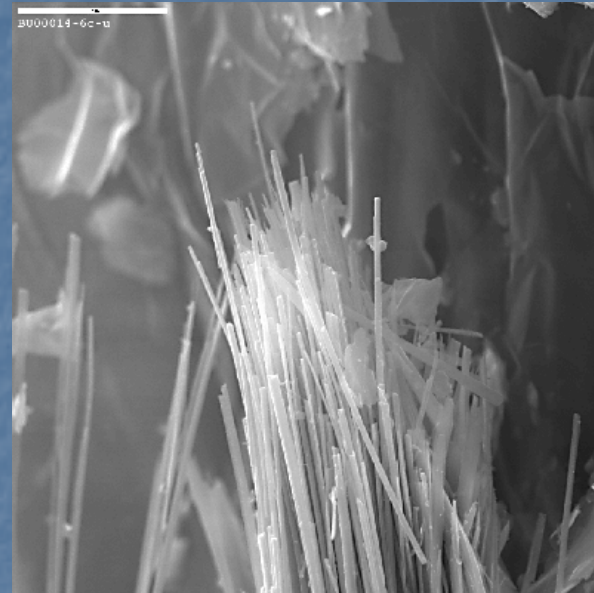


Types of Asbestos



Serpentine

- 95% of commercial use
- Fibers flexible & curved
- Less persistent in lungs

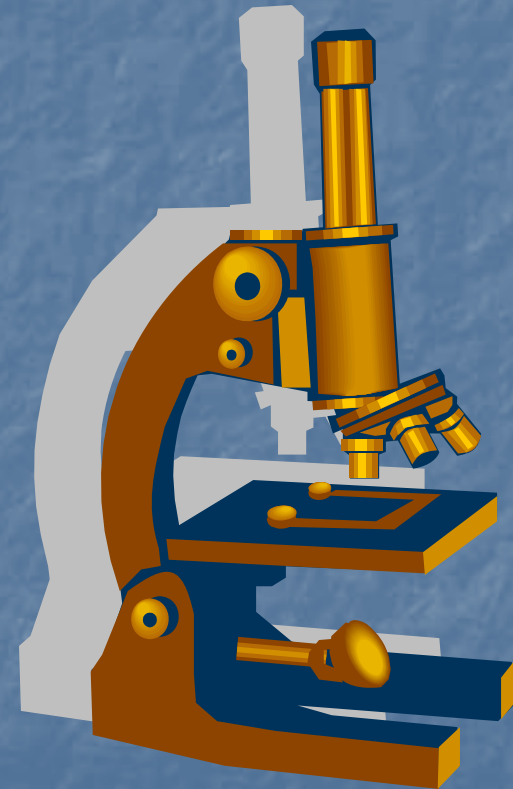


Amphibole

- Little commercial use
- Rigid spears or needles
- More persistent in lungs

Can a Person See ONE Asbestos Fiber with the Naked Eye?

- Fibers are invisible to the naked eye
- Need very special microscope, not a regular microscope
- Fibers are tiny (smaller than a single hair)



Asbestos - A Review of the Science

- **Asbestos in California**

John Clinkenbeard

California Geological Survey

Gregg Swayze, Ph.D.

U.S. Geological Survey

What is NOA?

Naturally Occurring Asbestos

- NOA = natural geologic occurrence of asbestos-bearing minerals/rocks:
 - Calif state rock (serpentine) may contain NOA
 - NOA present in many (44/58) Calif counties
- Asbestos fibers are released from NOA-containing rock when disturbed:
 - Mining, Construction

NOA Occurrence in California

- Foothills & Faults
- Sierra Nevada foothills
 - Western El Dorado County
- Coastal Range foothills
- Northwest California

www.conservation.ca.gov/CGS/index.htm

<http://pubs.usgs.gov/of/2004/1304>

Types of Asbestos Fibers

■ Serpentine

- Chrysotile *

* Common types in
California NOA

■ Amphiboles

- Actinolite *
- Tremolite *
- Anthophyllite
- Crocidolite
- Amosite

Potential Problem with NOA

- **NOT A PROBLEM:** If NOA left alone and not disturbed and there is minimal release of fibers
- **POSSIBLE PROBLEM:** If human activity causes release of asbestos fibers in the air
 - Commercial Activities - mining, construction
 - Personal Activities - sports, gardening

Once airborne, asbestos poses an exposure risk
(from both commercial and NOA sources)

Asbestos - A Review of the Science

- **Asbestos & Health**

Jill Dyken, Ph.D., P.E.

John Wheeler, Ph.D., D.A.B.T.

Agency for Toxic Substances &
Disease Registry (ATSDR)

Asbestos Health Effects

Result from inhaling asbestos fibers into the lungs

- Fibers become trapped in the lungs;
- Chrysotile fibers are cleared from the lungs faster than amphibole fibers;
- Chrysotile fibers dissolve more readily in the lung.

Asbestos Related Diseases

- NON-CANCER:
 - Asbestosis
 - Pleural Changes
- CANCERS:
 - Mesothelioma
 - Lung Cancer

What is Asbestosis?

- Scarring of lungs caused by high exposure to asbestos => difficulty in breathing;
- Smoking decreases ability to clear asbestos fibers from the lungs:
 - Smoking may increase risk of asbestosis;
- A disease that progresses slowly; it takes **decades** to develop signs and symptoms.

What are Pleural Changes?

- Pleura = lining of the lungs & lung cavity;
 - Thickening & hardening of the pleura;
 - Potential higher risk of cancer;
 - Role of smoking – not clear;
 - Usually, no early symptoms;
- Sometimes observe decreased lung function

What is Mesothelioma?

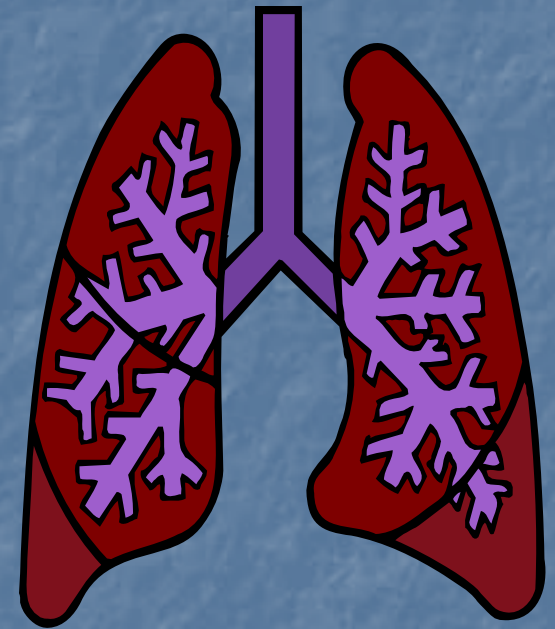
- A rare cancer - affects the lining of the lungs or lung cavity or the lining of the abdominal cavity;
- Known asbestos exposure is primary cause of mesothelioma;
- Most cases develop many **decades** after known exposure;
- Poor prognosis.

In What Groups of People Does Mesothelioma Occur?

- Mostly seen in work-related asbestos exposure (high asbestos levels)
- May be related to lower levels (environmental exposures) of asbestos exposure, how much lower is still uncertain

What is Lung Cancer?

- Cancer that invades and blocks the lung's air passages.
- Cigarette smoking **greatly** increases the likelihood of lung cancer.
- Lung cancer caused by smoking or asbestos looks the same



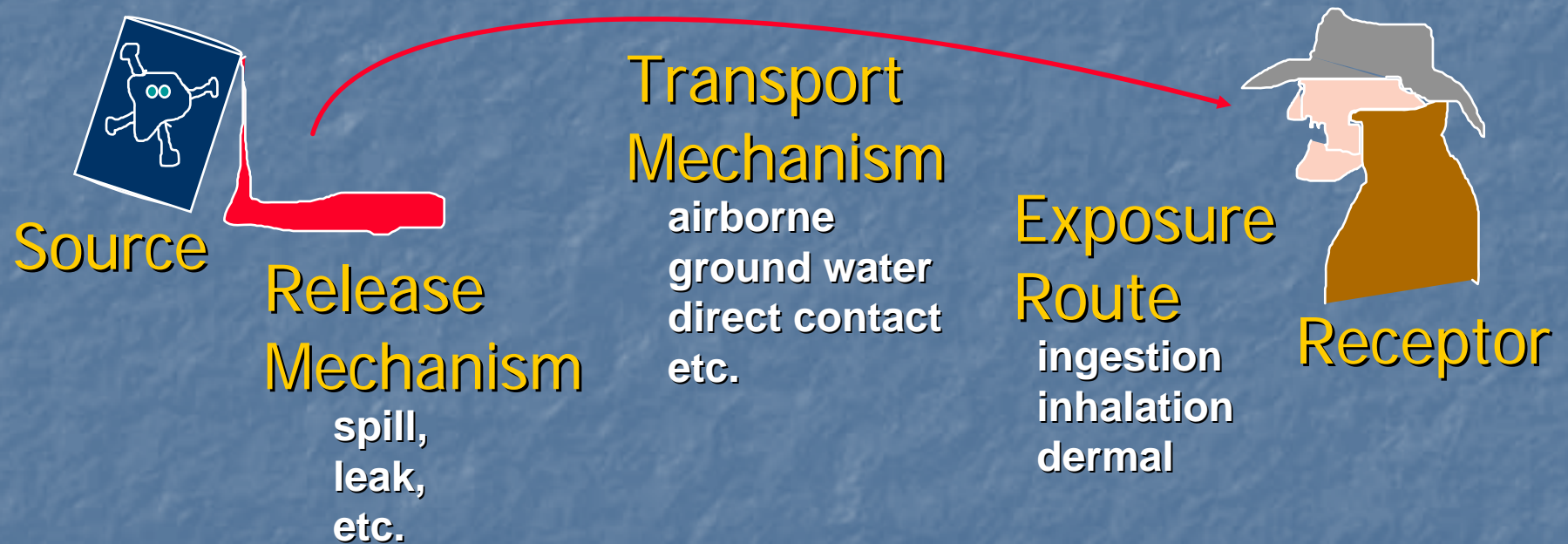
Asbestos - A Review of the Science

- **Measurement & Monitoring of Exposure**

Christopher Weis, Ph.D., D.A.B.T.

U.S. Environmental Protection Agency

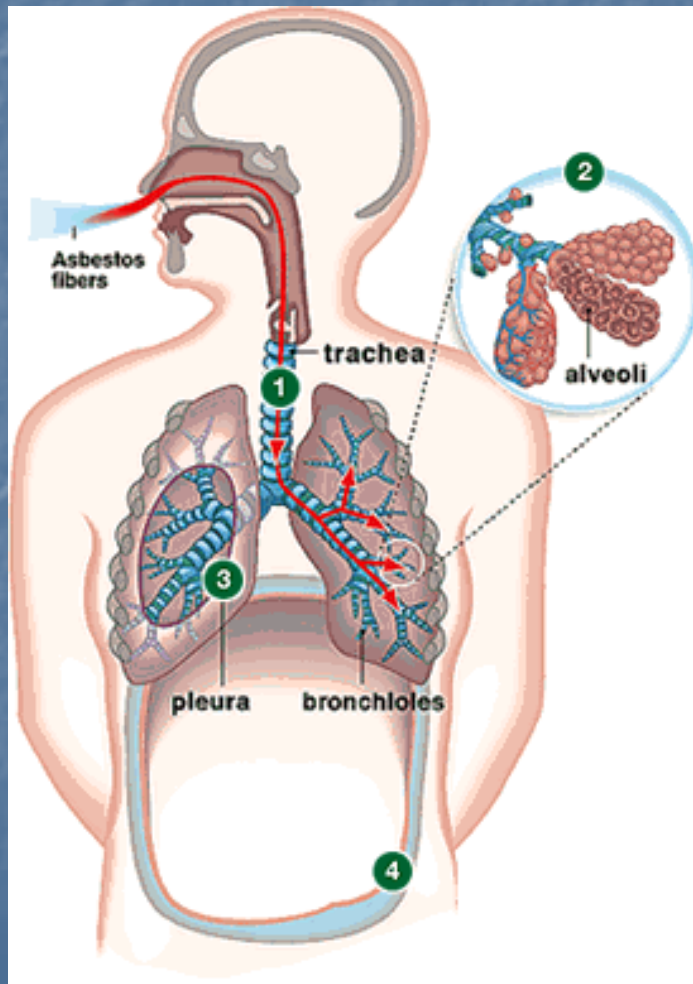
Exposure Pathway Components



How Can a Person Become Exposed to Asbestos?

- Fibers become airborne and can be breathed into the lungs;
- Not a problem if:
 - Asbestos-containing minerals in soil are left undisturbed.

Fiber Deposition in the Lung



Amosite asbestos fibers seen under electron microscope appear as tiny, fine, straight images.

Human Hair

Tremolite



What Factors Determine the Odds of Getting Asbestos-Related Disease?

- How much:
 - concentration of asbestos in air
- How long:
 - duration
- How often:
 - frequency
- Smoking history
- Size/Type of asbestos fiber
- Other pre-existing lung conditions

What is the Risk of Illness from Asbestos?

- People are more likely to experience health effects when they are exposed:
 - to higher concentrations,
 - for longer periods of time, and/or
 - are exposed more often.
- Not everyone who is exposed will develop asbestos-related disease.
 - We all have asbestos fibers in our lungs
 - Exactly how much asbestos exposure is needed to cause illness is not known precisely.

How to Measure Exposure

- Air sampling needed for meaningful exposure assessment;
- Must sample air during dust-generating activities (ambient air measurements do not reflect exposure potential);
- Must measure and characterize all fiber sizes and fiber types.

Exposure Assessment Summary

- Measurements made directly from the breathing zone are most valuable;
- Measurements from stationary monitors do not provide reliable estimates of human inhalation exposure;
- Dust and/or soil measurements are extremely difficult to convert to estimation of exposure.

Asbestos - A Review of the Science

- **U.S. EPA's concern re: El Dorado**

U.S. EPA's Concern - El Dorado



- Dust-generating activities by children that create a "personal dust cloud"
- "Pig Pen" effect

Why is U.S. EPA Concerned?

- Asbestos is a Known Human Carcinogen that also causes serious non-cancer disease;
- Children are at higher risk;
- Much of El Dorado asbestos is amphibole type (more potent form; chrysotile also toxic);
- Air testing at Oak Ridge H.S. showed elevated exposure potential at sports venues (now clean).

Does the same potential exist at other places where children play in El Dorado?

What is U.S. EPA Proposing?

- Activity-based measurement of airborne asbestos exposure;
- Test areas where children engage in dust-generating activities
 - schools
 - playgrounds
 - sporting venues

Summary - EPA Concerns

- What we know:
 - NOA is present in El Dorado Hills
 - Amphiboles are present
 - Elevated asbestos exposure potential existed at ORHS (now cleaned up)
- What we DON'T know:
 - Potential for elevated exposure at other schools, playgrounds and sports venues?

Take Home Concepts

- Asbestos is a risk when airborne;
- Amphiboles are more toxic than chrysotile;
- Children are at higher risk than adults;
- Dusty activities create higher exposures;
- Dust suppression can limit exposure.

Questions

What can you do now?

Limit Exposure

- Stay on pavement; avoid mud and exposed soil
- Wipe shoes before coming inside
- Immediately clean up mud and soil tracked indoors
- Wet-mop and wet-wipe surfaces and dispose of the water down the drain
- Avoid dry-sweeping, indoors and out
- Steam-clean carpets if you believe they might hold asbestos-contaminated dust
- Replace carpets with hard surfaces if possible
- Avoid smoking tobacco

What should I do to reduce my risk
from asbestos exposure?

THE KEY: PREVENTION

- Minimize / avoid further exposure to any form of asbestos
- STOP smoking / AVOID second-hand smoke
- Get regular medical care

When is Asbestos a Concern in the Environment?

- Exposure concern:

- When fibers become airborne
- Risk of breathing in fibers
- Continued exposure increases the amount of fibers that remain in the lung

- No immediate exposure concern:

- When left undisturbed or encased in building materials (tiles, insulation) or behind barriers
- Not able to breathe in fibers